CLAIMS

1. A cell for electrowinning a metal from a compound thereof dissolved in a molten salt electrolyte, in particular aluminium from dissolved alumina, said cell comprising an anode and a cathode that contact the molten electrolyte, the cathode being during use at a cathodic potential for reducing thereon species of the metal to be produced from the dissolved compound, the electrolyte further containing species of at least one element that is liable to contaminate the product metal and that has a cathodic reduction potential which is less negative than the cathodic potential of the metal to be produced,

wherein the cell further comprises a collector for removing species of said element(s) from the electrolyte, said collector having an electrically conductive surface in contact with the molten electrolyte, the conductive collector surface being during use at a potential that is:

- less negative than the cathodic potential of the produced metal to inhibit reduction thereon of species of the metal to be produced; and

- at or more negative than the reduction potential of the species of said element(s) to allow reduction thereof on the conductive collector surface,

the cell being so arranged that species of said element(s) are reduced on the conductive collector surface rather than on the cathode so as to inhibit contamination of the product metal by said element(s).

2. The cell of claim 1, wherein the cell is arranged to promote during use an electrolyte circulation from and towards the cathode, the conductive collector surface being exposed to molten electrolyte that circulates towards the cathode and that contains the species of said element(s).

3. The cell of claim 2, wherein the conductive collector surface is positioned outside a gap spacing the anode and the cathode, the conductive surface being electrically connected to a means for applying a potential.

4. The cell of claim 1 or 2, wherein the conductive collector surface is positioned between the anode and the cathode.

5. The cell of claim 4, wherein the conductive collector surface is electrically connected to a voltage source.

6. The cell of claim 4, wherein the potential of the conductive collector surface is set by its position relative to the anode and cathode.

7. The cell of any preceding claim, comprising a means for supplying to the conductive collector surface a current for reducing species of said element(s) on the conductive collector surface during use.

8. The cell of any preceding claim, wherein the electrolyte contains dissolved product metal and/or another metal that during use is/are oxidised on the conductive collector surface to pass an electric charge that reduces species of said element(s) on the conductive surface.

9. The cell of claim 8 for electrowinning aluminium, wherein the electrolyte is a sodium-containing electrolyte and said other metal is sodium that is reduced from the electrolyte.

10. The cell of any preceding claim, wherein the conductive surface of the collector is made of carbon.

11. The cell of any one of claims 1 to 9, wherein the conductive surface of the collector is metal-based, the conductive surface being at a potential below the potential of electrochemical dissolution of the metal-based surface.

12. The cell of claim 10, wherein said metal-based surface comprises at least one metal selected from titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper, yttrium, zirconium, niobium, molybdenum, ruthenium, rhodium, palladium, hafnium, tungsten, rhenium, iridium, platinum and gold, and/or a compound thereof such as an oxide or a boride.

13. The cell of any preceding claim, wherein the species of said element(s) comprise species of at least one metal

selected from nickel, iron, copper, cobalt, titanium, chromium, manganese, yttrium, cadmium, tin, antimony, gold, platinum, silver, cerium, palladium, ruthenium, tungsten, bismuth and lead.

14. The cell of claim 13, wherein the anode has a surface that comprises one or more of said metal(s) in metallic form and/or in a compound.

15. The cell of any one of claims 1 to 13, which comprises one or more carbon anodes.

16. The cell of any preceding claim, wherein the species of said element(s) comprise species of at least one metalloid or non metal such as sulphur.

17. The cell of any preceding claim, wherein the conductive collector surface is formed by one or more elongated members.

18. The cell of claim 17, wherein the conductive collector surface is formed by a wire, in particular a spiral.

19. The cell of claim 17, wherein the conductive collector surface is formed by one or more bars, in particular a grid.

20. The cell of any one of claims 1 to 16, wherein the collector surface is formed by a foraminate structure through which the electrolyte can circulate, in particular a structure in the form of a perforated plate, a honeycomb structure or a foam.

21. A method of electrowinning a metal in a cell as defined in any preceding claim, comprising:

a) setting the cathode at a cathodic potential for reducing thereon species of the metal to be produced;

b) setting the conductive surface of the collector at a cathodic potential that is:

- less negative than the cathodic potential of the metal to be produced to inhibit reduction thereon of species of the metal to be produced; and

- at or more negative than the reduction potential of the species of said element(s);

c) producing the metal on the cathode from the dissolved compound of the metal to be produced; and

d) reducing species of said element(s) on the conductive collector surface rather than on the cathode so as to inhibit contamination of the product metal by said element(s).

22. The method of claim 21, wherein the conductive collector surface is at a potential in the range from 0.5 to 1.5 V above the cathodic potential of the metal to be produced, in particular from 0.7 to 1.2 V thereabove.

23. The method of claim 22 for electrowinning a metal selected from aluminium, magnesium, titanium, manganese, sodium, potassium, lithium, zirconium, tantalum and niobium.

24. A cell for electrowinning aluminium from alumina dissolved in a molten electrolyte, comprising an anode and a cathode that contact the molten electrolyte, the cathode being during use at a cathodic potential for reducing thereon aluminium species from the dissolved alumina, the electrolyte further containing species of at least one element that is liable to contaminate the product aluminium, wherein the cell further comprises a collector for removing species of said element(s) from the electrolyte, said collector having a surface in contact with the molten electrolyte, the cell being so arranged that species of said element(s) dissolved in the molten electrolyte are collected on the collector surface rather than on the cathode so as to inhibit contamination of the product aluminium by said element(s).

25. A method of electrowinning aluminium in a cell as defined in claim 24, comprising: producing aluminium on the cathode from the dissolved alumina; and collecting species of said element(s) on the collector surface rather than on the cathode so as to inhibit contamination of the product aluminium by said element(s).

26. A cell for electrowinning a metal from a compound thereof dissolved in a molten electrolyte, said cell comprising an anode and a cathode that contact the molten

electrolyte, the cathode being during use at a cathodic potential for reducing thereon species of the metal to be produced from the dissolved compound, the electrolyte further containing species of at least one element that is liable to contaminate the product metal and that has a cathodic reduction potential which is less negative than the cathodic potential of the metal to be produced,

wherein the cell further comprises a collector for removing from the electrolyte species of said element(s), said collector having an electrically conductive surface in contact with the molten electrolyte, the conductive collector surface being during use at a potential that is:

- less negative than the cathodic potential of the produced metal to inhibit reduction thereon of species of the metal to be produced; and

- at or more negative than the reduction potential of the species of said elements to allow reduction thereof on the conductive collector surface,

the cell being so arranged that species of said element(s) are reduced on the conductive collector surface rather than on the cathode so as to inhibit contamination of the product metal by said elements.

27. A method of electrowinning a metal in a cell as defined in claim 26, comprising: producing the metal on the cathode from said dissolved compound; and reducing species of said element(s) on the collector surface rather than on the cathode so as to inhibit contamination of the product metal by said element(s).